EVOLUTION OF THE NONMARINE BIVALVE MOLLUSK ASSEMBLAGES IN THE PERMIAN LAKES OF NORTHERN EURASIA

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At present, among all known Permian faunas of nonmarine bivalves, the East European *Palaeomutela* Fauna is most thoroughly investigated and unequivocally understood by different researchers. The zonal scale of the Permian deposits developed on the basis of the *Palaeomutela* sensu lato phylogenetic lineages (Silantiev, 2014) and contemporaneous beds with the fauna of accompanying genera of nonmarine bivalves (Silantiev, 2016) form a detailed biostratigraphic basis suitable for correlation of localities of Permian nonmarine bivalves from other regions with the sections of the East European Platform.

The genus *Palaeomutela* sensu lato appeared at the end of the Kungurian Age of the Cisuralian time (Late Kungurian, Cisuralian). The first records of this genus are known from the lower part of the Solikamsk Formation (Ufimian Regional Stage, *stegocephalum* Zone) of the Solikamsk Depression of the Cis-Ural Foredeep. *Palaeomutela* sensu lato rather rapidly (Sheshminskian Regional Stage, *ovatiformis* Zone) occupied nonmarine basins of the Cis-Urals and eastern marginal area of the East European Platform. Simultaneously, some species of *Palaeomutela* sensu lato could have migrated into coal-bearing basins of the Angarian Realm (Kuznetsk Basin, northern China). Subsequently, in the Wordian Age (Urzhumian Regional Stage), members of *Palaeomutela* sensu lato penetrated into the basins of Gondwana (India and South Africa). In the second half of the Capitanian Age (Severodvinian Regional Stage), *Palaeomutela* sensu lato community changed considerably and began to include (in approximately equal proportions) two morphologically different species groups, i.e., the *P.* (*Palaeomutela*) *keyserlingi* (chevron-shaped hinge) and *P.* (*Palaeanodonta*) *fischeri* (toothless hinge) groups. During the Lopingian time (Vyatkian Regional Stage), members of these groups became widespread throughout the globe (Silantiev, Carter, 2015).

During the cold climatic phases of the Permian, cold-resistant Angarian genera of nonmarine bivalves migrated beyond the initial range, first, into the basins of the Cis-Ural Foredeep and, then, into the basins of the East European Platform. Thus, the territory of Eastern Europe was occupied by members of *Sinomya*, "*Concinella*," *Intaella*, *Redikorella*, *Prilukiella*, *Anadontella*, and *Concinella* sensu stricto (Silantiev, 2015). In the Wordian Age (Urzhumian Regional Stage), members of the Angarian Fauna reached Gondwana, penetrating into the basins of India (Silantiev et al., 2015). The events of migration and faunal exchange of nonmarine bivalves can be used for correlation.

The analysis of distribution of nonmarine bivalves in the Permian beds of various regions of the Earth has revealed three faunal groups most significant for correlation.

Family Palaeomutelidae, including members of *P. (Palaeomutela)*, *P. (Palaeanodonta),* and *Oligodontella*, is of the greatest significance for correlation. It allows comparisons of the Permian nonmarine beds of the Euramerican, Angarian, Cathaysian, and Gondwanan realms. *The lower correlation level,* i.e., the Kungurian–Roadian (Kazanian) interval, is traced in the Euramerican and Angarian realms by a set of similar morphotypes characteristic of the *ovatiformis–umbonata* zones (*P. umbonata* group) and *castor–olgae* zones (*P. castor* group). *The middle correlation level* is the Late Capitanian (Late Severodvinian) interval, which is traced in the Euramerican, Angarian, and Gondwanan realms. It is characterized by the presence of *Oligodontella* and forms of *Palaeomutela* with the well-ordered "chevron-shaped" hinge characteristic of species from the *keyserlingi* Zone. *The upper correlation level* is the Lopingian (Vyatkian) interval, which is traced in the Euramerican, Angarian, Cathaysian, and Gondwanan realms. It is characterized by co-occurrence of *P. (Palaeanodonta)* and species of *P. (Palaeomutela)* with a reduced hinge.

The Anadontella–Prilukiella group, including members of these genera, can be used for comparison of the Permian nonmarine beds of the Euramerican, Angarian, and Gondwanan (coal-bearing basins of India) realms within the interval of the Wordian (Urzhumian) Stage.

The Concinella group, including members of the genus *Concinella* and primarily the type species *Concinella concinna* (Jones), can be used as an additional marker for correlation of the Late Capitanian (Late Severodvinian) interval of the Euramerican and Angarian realms (Pechora, Kuznetsk, and Tunguska basins and Taimyr).

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PALEOGEOGRAPHIC RESEARCHES OF LATE GLACIAL AND EARLY HOLOCENE IN THE NORTHWEST OF THE EAST EUROPEAN PLAIN

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Nowadays the problem of changing natural conditions at the boundary of the Late Pleistocene and the Holocene is given special attention, because during this period of time the ice sheet was destroyed and the subsequent transformation of the environmental conditions from cold, arctic to warm and wet.

Within the Russian part of the north-west of the East European Plain, work is underway to reconstruct the natural conditions of the Late Pleistocene and Holocene transition: in the Kaliningrad Region [Druzhinina et al. 2015; Kublitskiy et al. 2014; Kublitskiy 2016], and Karelian isthmus [Andronikov et al. 2014; Kuznetsov, 2014; Subetto et al. 2016; Syrykh et al. 2017].

The purpose of the study is to reveal the synchronicity / asynchrony of the processes of lakes sedimentation and changes in natural conditions at the boundary of the Pleistocene and Holocene in the northwestern part of the East European Plain on the basis of generalizing and supplementing the paleogeographic data. It is planned to create a paleogeographic and paleoecological database for the objects of the northwest of the East European Plain (the Kaliningrad, Smolensk, Pskov, and Leningrad regions of the Russian Federation, as well as the territories of Lithuania, Latvia, Estonia and the Republic of Belarus), which has a qualitative geochronological link to the Late Pleistocene and Holocene to monitor the conditions of the lake systems and the dynamics of their changes in the past. This approach is actively developing in Russia [Grekov et al. 2014; Grekov, Subetto, 2015; Grekov et al. 2018]. After summarizing and analyzing the available information, it is planned to identify key areas, information on which is not sufficient to perform paleogeographic reconstruction.

As a result of the project implementation, a general paleogeographic reconstruction for the claimed time interval will be built on the basis of lithological, geochemical, palynological, chironomid, geochronological analyzes and LOI of the selected objects bottom sediments in the northwest of the East European Plain.